ISI **INTERNATIONAL STRATEGY & INVESTMENT**

Cloud Computing

Information Security and Privacy Advisory Board

Bill Whyman

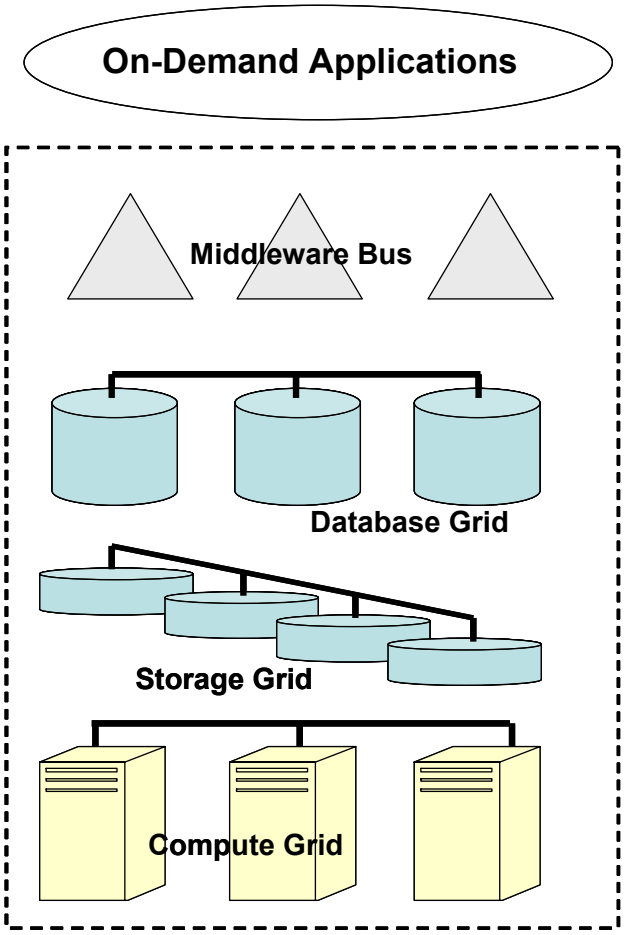
December 5, 2008

bwhyman@isigrp.com

Cloud Computing Is the BIG Change In I.T.

Cloud applications

Cloud infrastructure



Increasingly, in a **cloud computing world,** applications are "click to run" services that live in remote Internet data centers – not on the PC or local server. They scale to millions and use shared IT infrastructure.

Not all applications will move to the cloud. However, **on the margin, new applications, usage and customers are moving to the cloud – taking revenue with them.** Cloud does NOT necessarily mean "thin client."

This is a disruptive change, impacting the user experience, IT industry economics, product design, how companies go to market, and raises security & regulatory issues.

Cloud Computing Has Multiple Dimensions

Application as a service

Applications offered directly to the user as a "click to run" network service

- CRM
- N
- GOOG
- MSFT CRM

On-demand apps (SaaS) refers primarily to the software applications & Internet services running as a network service.

Computing as a service

Underlying IT resources (compute, storage, database) as a public network service

- AMZN Web Svcs.
- GOOG App Engine
- CRM Force.com
- MSFT Azure
- IBM Blue Cloud

Cloud computing extends down into the underlying hardware, storage and networking infrastructure.

Tools to build own private cloud or prvt. outsource

Sell customers tools to build their own mini-cloud or manage it for them (remote or on-premise)

- IBM
- HPQ
- JAVA
- ORCL
- RHT

Many IT vendors are associating themselves with clouds. Most sell tools to help customers make their on-premise infrastructure more "cloud-like."

Cloud Computing Key Issues

- Customer adoption: security, trust, performance
- Industry disruption: winners & losers
- Is there such a thing as “private clouds”?
- Regulation: data privacy, especially globally
- Cloud means big changes for network infrastructure

What Is Cloud Computing?

Cloud computing, like much of IT, builds on earlier technologies and concepts, e.g., utility computing, grids, service oriented architecture, and virtualization. While the definition will evolve, the 5 core common characteristics are:

1. **Services.** Applications are used or consumed as reusable services over the Internet rather running the code on your own on-premise computer.

2. **Scale.** Applications are designed to be delivered in scale to millions of users. This poses technology architecture challenges.

3. **Shared.** The underlying computing resources (processing, database, storage) used by each customer are not physically separate. They are "pooled" resources. Private hosting is not "cloud".

4. **Outsourced to the Internet.** Applications live on the network (cloud) and interact with other programs on the network. Physical computers are offsite in a remote data center. The user does not "own & operate" IT.

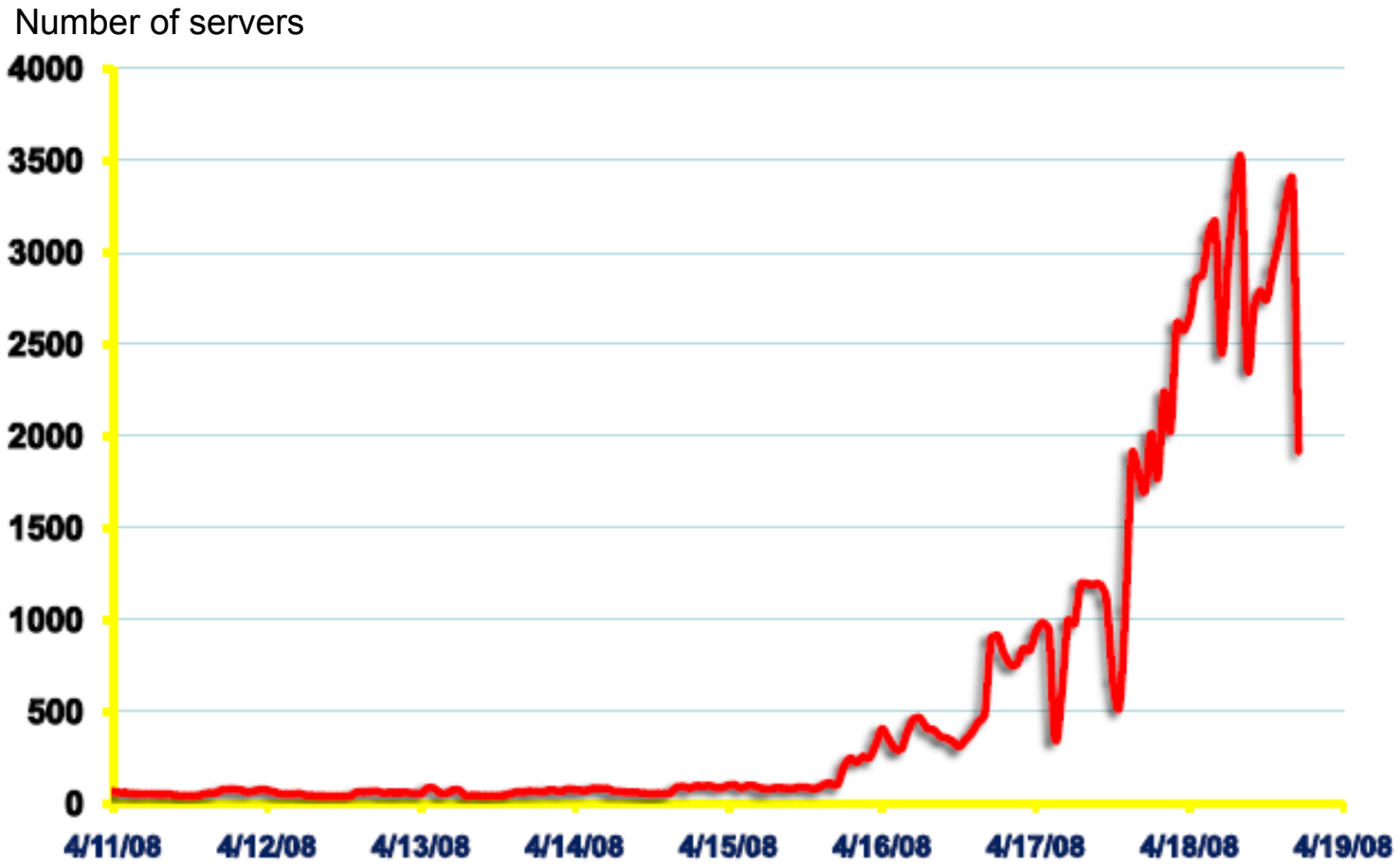
5. **Business model.** The customer does NOT purchase a license but subscribes, usually on a per seat or per-usage basis. When the subscription stops, the service stops.

Customer Benefits of Cloud Computing

- Lower total costs and lower fixed costs; usage-based pricing and variable costs
- Flexibility to scale up and down IT capacity over time, 24x7, to business needs.
- More agile, responsive IT capabilities to changing business needs
- Potentially faster Innovation from faster releases & shared user community
- Agnostic to specific operating systems, chip CPU technologies

Scaling From 50 to 3500 Servers In 3 Days

Example: Animoto - Music Video Generator on Amazon Web services



Source: Amazon

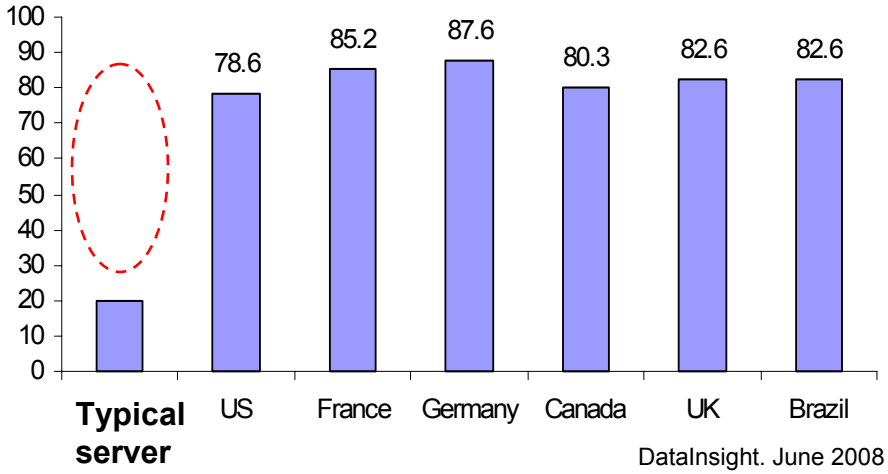
Cloud Computing Cost Savings

1. Better capacity utilization

(Buy less)

Why do businesses run their manufacturing capacity at ~80% but their computers at ~20%?

Manufacturing Capacity Utilization v. Computer



DataInsight. June 2008

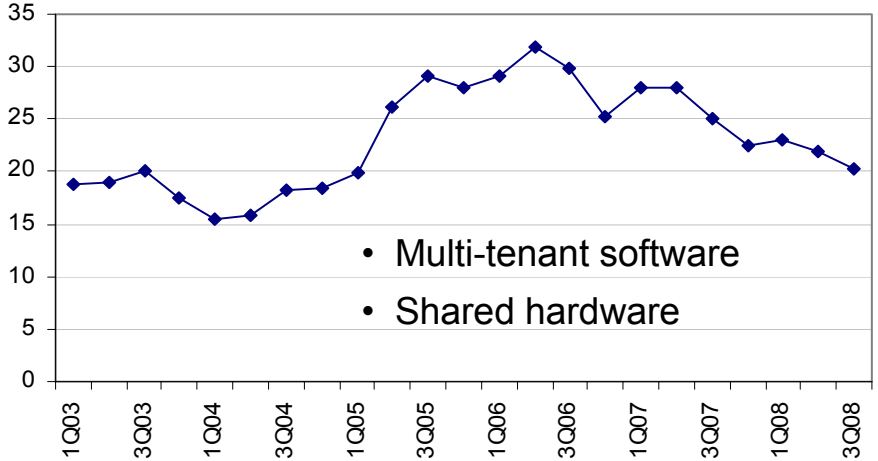
2. Lower cost architectures

(Pay less per unit)

On premise solution:

x86 server, 2 quad core	$10,000
Relational Database	5,000
Server Oper. System	1- 4,000
Enterprise CRM per user	3,000
+ Maintenance & support	???

Cost per subscriber ~$20/quarter estimate[1]



(1) Salesforce cost per subscription & support per total subscribers. Subs estimated in F'09

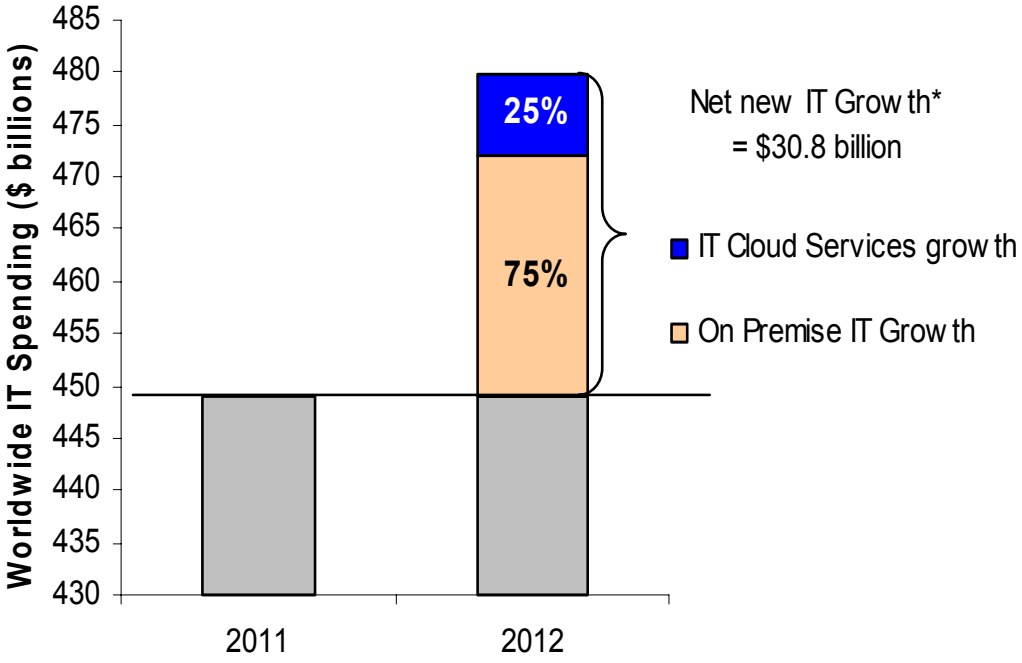
Not All Applications Move To The Cloud

Not all applications will move to the cloud. This shift will take place at varying speeds in different sectors, countries, and kinds of applications.

- **Class of applications**: graphics intensive, latency, big data input-output, etc. are less likely to move to the cloud.
- **Customer needs**: enterprise vs. small business vs. consumer vs. mobile. Users have different legal & business requirements.
- **Operational requirements**: security, integration, reliability, latency-sensitive, governance, etc. Users are likely to make different trade-offs .
- **Relative change in costs.** Moore's Law has driven faster cost reductions in processing and storage than in bandwidth. Bandwidth is an issue.
- **On-demand software aligns most around the needs of small & medium business**. Large businesses and advanced users will also use on-demand as compliments (rather than rip & replace) to existing systems.

Cloud Technology Spending Is Small Relative to Total But is a Big Part of Incremental Growth

Sources of Incremental IT Spending* Growth in 2012. Cloud vs. On-Premise

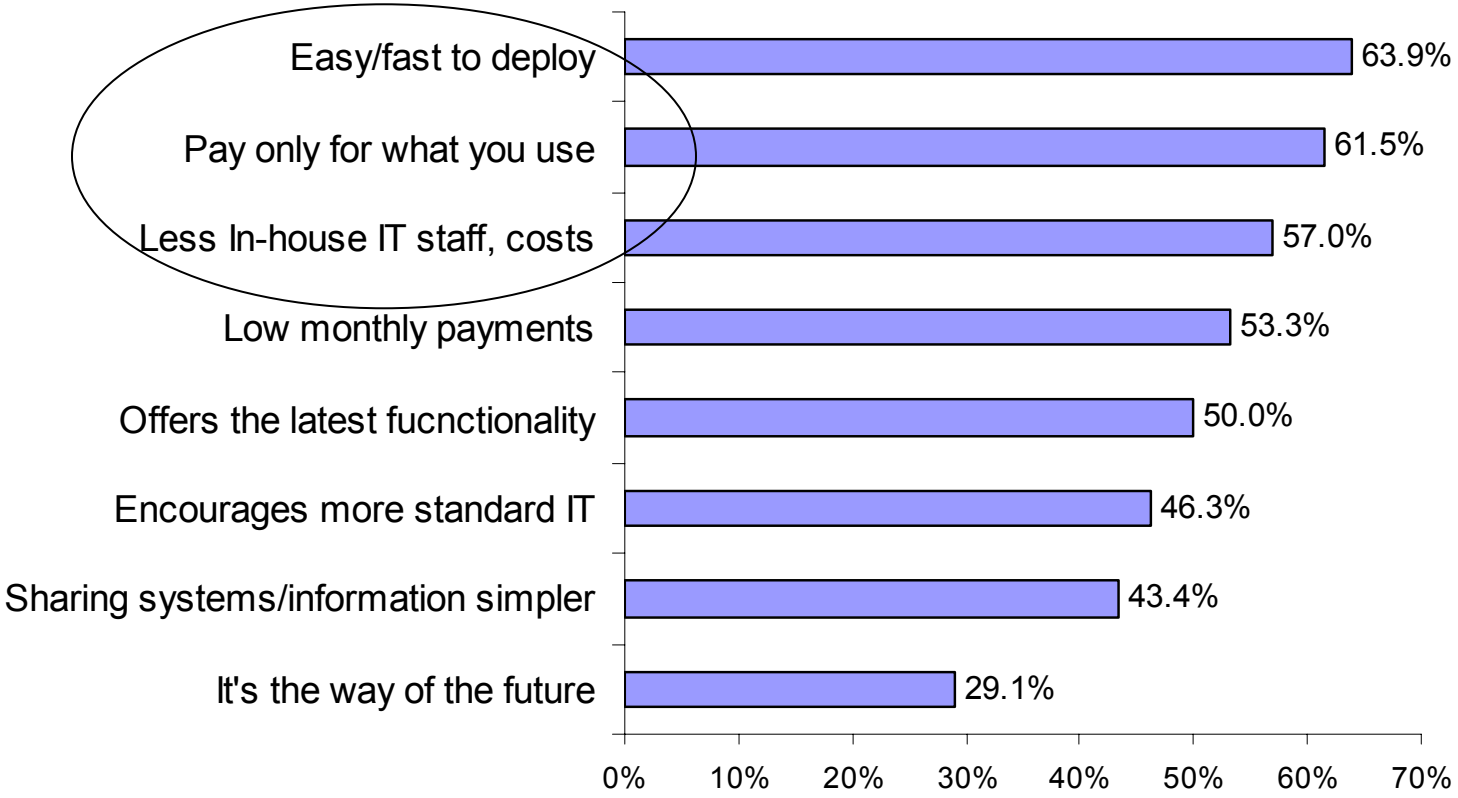


- ~$16b or 4% of IT spending is for "cloud", says IDC.
- By 2012 IDC forecasts $42b, or 9%, of spending.
- Regardless, whether these point forecasts are right, we believe the 4 to 9% is the right way to think about this:
  - Small part of total but growing quickly
  - Increasingly large part of incremental spending

*Includes enterprise IT spending on Business Applications, Systems Infrastructure Software, Application Development & Deployment Software, Servers and Storage
Source: IDC, Oct 2008

Why Customers Value Cloud: Easy to Deploy and Better Economics

Q: Rate the benefits commonly ascribed to the 'cloud'/on-demand model

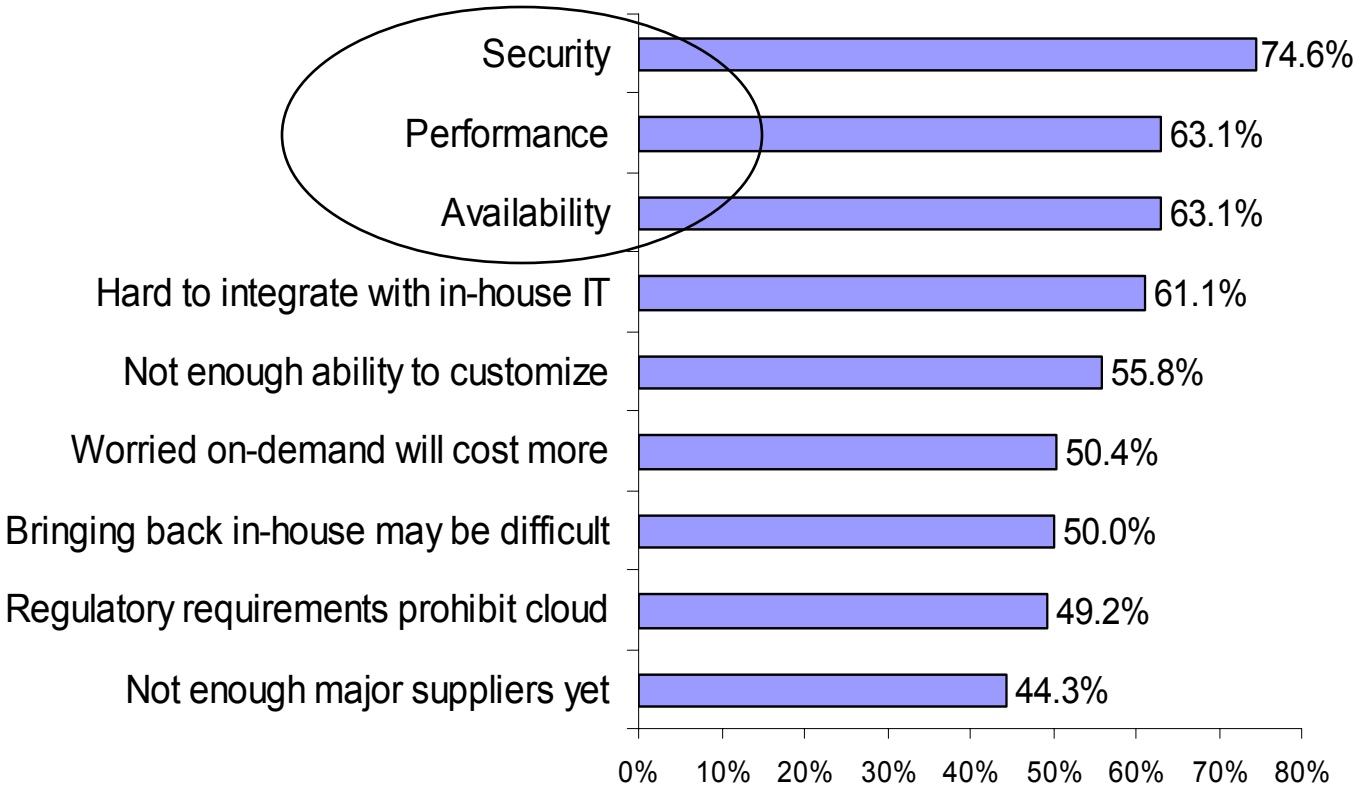


% responding 4 or 5, where 1= not important, 5= very important

Source: IDC Enterprise Panel, August 2008 n=244

Customers Big Concerns About Cloud: Security, Performance, Availability

Q: Rate the challenges/issues ascribed to the 'cloud'/on-demand model



% responding 4 or 5, where 1= not important, 5= very important
Source: IDC Enterprise Panel, August 2008 n=244

Is it Security or Is It Control?

Ottawa Will Not Give Personal Data to the U.S.

Dec. 01, 2008. The Star (Canada)

Ottawa - Ottawa has quietly dropped plans to let the U.S. house a database of personal information about Canadians who hold special drivers licenses to cross the borders.

This will be a big issue internationally

Yet cloud based applications are being used by:

GE, Merrill Lynch, Cisco, Japan Post Office, Citibank, Sprint, Symantec, CIT, Chevron, Dell, Canon, NTT, Allianz, Wells Fargo.

Do they not care as much about security?

Leading Vendors Offering Computing as a Service

Sun microsystems
NETWORK.COM

Google App Engine

IBM
Blue Cloud

amazon web services™

Salesforce.com

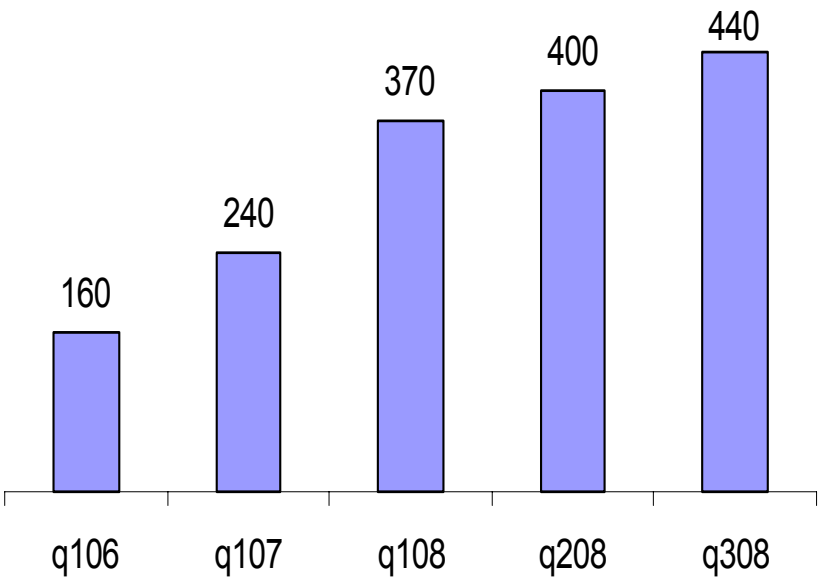
Microsoft Azure

Amazon Web Services Momentum

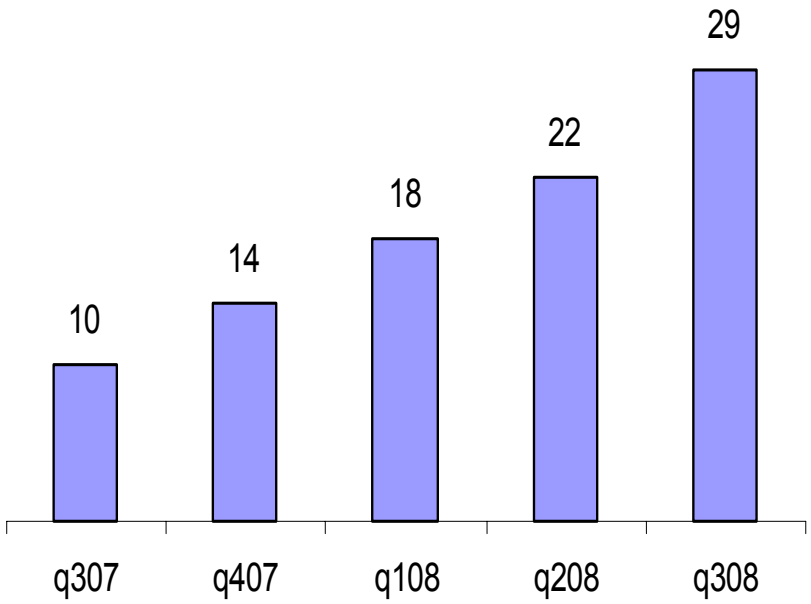
Lots of developers storing lots of objects in the cloud

Many companies are finding value

AWS Registered Developers

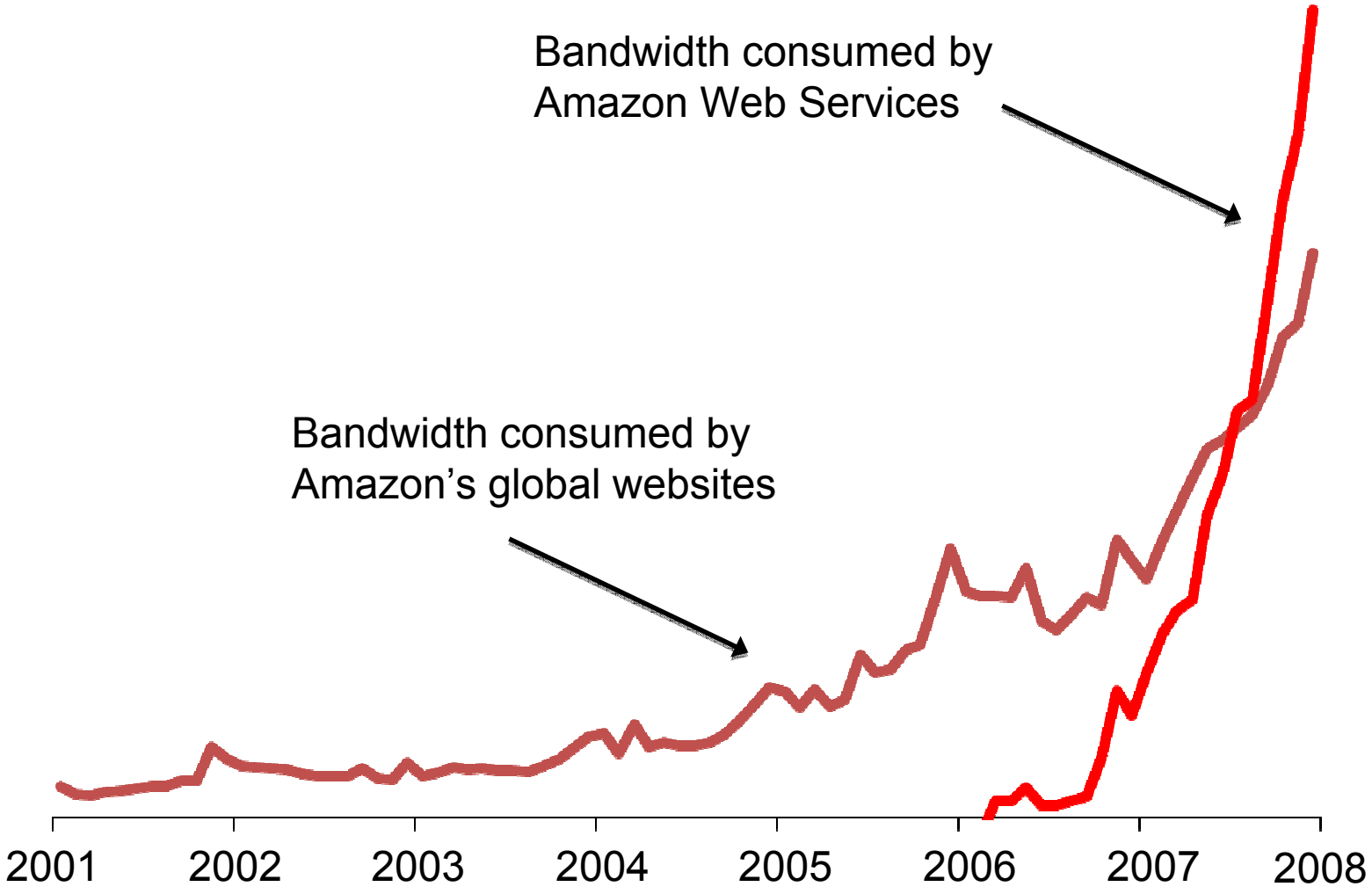


Billions of Stored S3 objects



Source: Amazon

Usage of Amazon Web Services Growing Rapidly



Source: Amazon

Issues for Public Sector Users

- Do Federal Government agencies really want a ‘cloud’ or just many of the benefits?
- Security & data privacy is a big issue for many agencies. Civilian vs. Defense/Intelligence/Homeland Security/Energy
- Different cultural approach. Less control.
- May be more appropriate for public facing government services for citizens
- Procurement. Buying IT vs. subscribing to services
- Cloud computing does not mean IT governance issues goes away